

# A practical approach to managing hoarseness

The voice is one of the unique characteristics of human beings and is of vital importance in communication. Management of patients complaining of hoarseness is the responsibility of a team comprising GPs, laryngologists and speech therapists.



**NEVILLE L. MINNIS**  
MB BS, FRCS, FRACS

Mr Minnis is Honorary Consultant ENT Surgeon, Department of Otolaryngology, Head and Neck Surgery, Queen Elizabeth Hospital, Woodville, and a Laryngologist in private practice at St Andrew's Private Hospital, Adelaide, SA.

The term 'hoarseness' is used by patients to describe any change in the quality of the voice. Complaints may include loss of voice – ranging from complete loss (aphonia) to a slight vocal weakness and inability to project the voice – as well as gross dysphonia typified by a coarse scratching sound produced on phonation.

The role of the larynx (Figure 1) in the production of voice is discussed in the box on page 37. A range of conditions affecting the larynx can impair voice quality (Table 1). This article focuses on the underlying problems that can contribute to hoarseness, and presents a guide to diagnosis and management.

## Evaluation

The evaluation of a patient who is complaining of hoarseness needs to be conducted diligently,

remembering that the vast majority of patients will have benign disease but that occasionally malignancy will present. Early detection of neoplasms affecting the larynx is associated with a dramatic improvement in prognosis – the five-year survival can vary from almost 100% for very early tumours confined to the vocal cords to 25% in very advanced cancers extending beyond the cords.

Some examples of pathology affecting the vocal cords are shown in the box on page 38; a guide to identifying structures visible on laryngeal examination is given in Figure 2.

## Presentation

The nature of a patient's hoarseness can provide important clues to the cause of the problem. The symptom may be extremely obvious, as in a case of acute laryngitis associated with an upper

## IN SUMMARY

- Hoarseness can be caused by systemic or local disease. A thorough history is essential to assess the significance of the symptom and will, in most cases, lead to a diagnosis.
- It is vital to find out how long hoarseness has been present. Any patient who has been hoarse for longer than four weeks needs a specialist assessment by a laryngologist to exclude carcinoma.
- Most patients with hoarseness are generally suffering from benign disease such as an acute upper respiratory tract infection. They can be treated with appropriate antibiotics, voice rest, inhalations of menthol and eucalyptus, and adequate hydration.
- Every attempt should be made to improve the health of the upper respiratory tract by controlling sinus disease and any gastro-oesophageal reflux. The proton pump inhibitor has been a giant leap forward in the treatment of laryngeal disorders secondary to oesophageal reflux.
- GPs may need to consider modifying the management of conditions such as hypertension, respiratory allergy or osteoporosis if medications are contributing to intolerable vocal symptoms.

## Table 1. Causes of hoarseness

### Disorders of the epithelium

Inflammation (acute or chronic laryngitis)

Leucoplakia

Hyperkeratosis

Carcinoma *in situ*

Carcinoma

### Lesions of the lamina propria

Diffuse lesion (Reinke's oedema, myxoedema)

Focal lesion (nodules, polyps, scar, superficial or deep cysts)

### Disorders of the arytenoid cartilage

Granuloma

Joint disruption (trauma, arthritis)

### Movement disorders of the larynx

Muscle tension dysphonia

Injury to the recurrent laryngeal or vagus nerve

Psychogenic causes

respiratory tract infection. A breathy voice after an upper respiratory tract infection may be indicative of a recurrent nerve palsy, whereas a harsh gravelly voice of a one-month duration in a middle-aged man who smokes would be a red flag for a vocal cord carcinoma (see Figure 3). Hoarseness associated with vocal fatigue in a professional singer would suggest the possibility of a vocal cord nodule (Figures 4a and b) or vocal cord granuloma.

The patient's age can give clues to specific disease entities. In a hoarse child who is between 1 and 3 years of age, one would need to exclude papillomata (Figure 5), a lesion that is similar in appearance and nature to condylomata of the genital region. Hoarseness associated with screaming in a child aged from 2 to 5 years would suggest 'screamer's nodules' or vocal cord nodules. In professional voice users aged in their early 20s through to their 50s, one would need to consider muscle tension dysphonia, a form of vocal abuse characterised by excessive muscular effort at the glottic and/or supraglottic levels. Atrophy of the vocal ligament is quite common in elderly patients, and results in bowing of the vocal cords with loss of projection as well as a

## Where is voice produced?

Voice is produced in the larynx, a tubular structure composed of muscle (both extrinsic and intrinsic) and cartilage that guards the entrance of the trachea (Figure 1). The tube is spanned by two pairs of elastic ligaments that stretch between the arytenoid and thyroid cartilages: the upper (false) and lower (true) vocal cords.

The vocal cords consist of an outer epithelial layer that covers three layers of connective tissue (the lamina propria), and the cricoarytenoid muscle. The inner surface of the trachea, including the vocal cords, is bathed in a mucociliary blanket; disease and adverse environmental conditions affecting this layer often lead to laryngeal dysfunction.

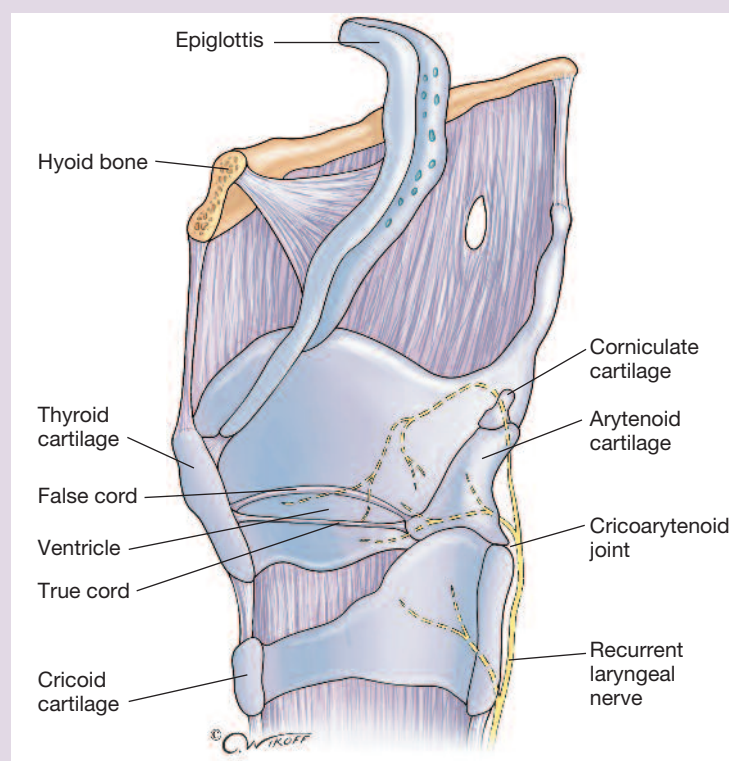


Figure 1. Sagittal section of the larynx.

degree of hoarseness. Other conditions, such as laryngitis, affect people of all ages.

## History

A detailed history should be taken because the majority of patients with hoarseness have multiple contributing factors (see Table 2).

## Gastro-oesophageal reflux

Many middle-aged and elderly patients suffer from

gastro-oesophageal reflux, one of the most important conditions predisposing to laryngeal disorders. Gastro-oesophageal reflux can occur in patients of all ages but is generally more common in the elderly. Note that not all patients will complain of heartburn, indigestion or belching. The reflux can extend right up into the

laryngopharyngeal area and nasopharynx, and may be associated with sinonasal disease, postnasal drip and a feeling of thick mucus at the back of the throat. Globus symptoms may be associated with a tendency to clear the throat, as well as cough and a burning sensation at the back of the throat. The evidence for an association

between gastro-oesophageal disease and carcinoma of the larynx is still tenuous.

## Autoimmune diseases

Autoimmune diseases may be present, such as rheumatoid arthritis which can restrict mobility of the vocal cords by affecting the cricoarytenoid joints of the larynx. There is also a tendency in ageing individuals for the development of sicca syndrome, which can be associated with Sjögren's syndrome.

## Endocrine factors

The most common endocrine abnormality to affect the voice and predispose to hoarseness is hypothyroidism. Simple thyroid function tests, such as measurement of TSH and T3, can detect the early hypothyroid patient when subtle changes of the voice are occurring, and appropriate replacement therapy may prevent permanent damage to the vocal cords.

Variations of the voice can occur during the menstrual cycle, but this variation is so slight that it really only affects professional voice users such as opera singers, who may be given leave from their singing commitments during their menses. Androgen therapy prescribed for osteoporosis has been associated with unacceptable hoarseness that may become a permanent disability.

## Neurological causes

Neurological conditions may form a backdrop for hoarseness, the most common being Parkinson's disease and motor neurone disease. Patients with Parkinson's disease suffer a fluency defect, but they also lose the ability to project the voice. In patients with motor neurone disease, swallowing difficulty generally precedes any voice problems, and even then the tongue is affected long before laryngeal function is impaired.

## Iatrogenic factors

Unfortunately, a number of cases of hoarseness are caused by damage to the

## Pathologies affecting the vocal cords

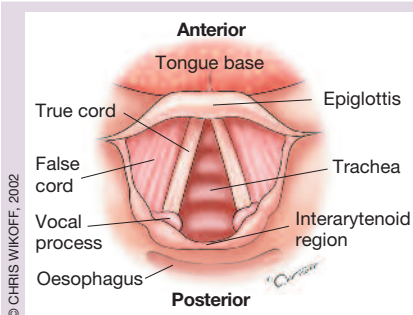


Figure 2. View of the healthy vocal cords on examination.



Figure 3. A large carcinoma of the right vocal cord.



Figure 4a. Small vocal cord nodules in a child.



Figure 4b. Nodules affecting both vocal cords in a rock singer.



Figure 5. Papillomata of the left vocal cord.



Figure 6. A polyp on the left vocal cord.

recurrent laryngeal nerve during thyroid surgery or even by compression by an overinflated laryngeal tube. Prolonged or difficult intubation may traumatise the vocal process of the arytenoid cartilages and lead to granulomas. Carotid artery surgery and cervical fusion where the major vascular bundle is retracted laterally may affect either the vagus nerve or the recurrent laryngeal nerve.

### Medication history

Taking a medication history is important because drug therapies can aggravate pre-existing conditions in the larynx. Antihistamines, for example, cause extreme dryness of the mucosa; nasal decongestants and antiparkinsonian agents can also cause dryness. Increasing numbers of patients are being placed on antihypertensive drugs as well as diuretics, many of which have a drying effect on the larynx. Corticosteroid aerosols used to control asthma add further insult to the larynx. Androgen therapy for osteoporosis and hormone therapy for breast cancer may have a permanent effect on the voice by causing irreversible changes in the vocal cord structure. Aspirin and NSAIDs can cause haemorrhage into the cords.

GPs may need to consider modifying the management of conditions such as hypertension, respiratory allergy or osteoporosis if medications are contributing to intolerable vocal symptoms.

### Social history

The adverse effects of tobacco smoking – both active and passive – on the mucosa of the respiratory tract are well documented and can initiate local disease or aggravate pre-existing conditions such as dysphasia and leucoplakia through to frank malignancy. Marijuana can also irritate the mucosa, and may be a factor in the development of aggressive head and neck tumours in young people. Alcohol, especially spirits, can lead to a drying effect on the mucous membrane and cause thickening of laryngeal secretions.

**Table 2. Factors that can contribute to hoarseness**

Factor	Possible effects on larynx
<b>Gastrointestinal disease</b> Gastro-oesophageal reflux	Inflamed mucosa
<b>Autoimmune diseases</b> Rheumatoid arthritis  Sjögren's syndrome	Ankylosis of the cricoarytenoid joints  Dryness of the mucosa
<b>Endocrine factors</b> Thyroid disease	Structural change in the vocal cords involving connective tissue and muscles
<b>Neurological causes</b> Parkinson's disease Motor neurone disease	Compromised vocal cord movement Compromised vocal cord movement
<b>Iatrogenic factors</b> Neck surgery (e.g. carotid artery endarterectomy, cervical disc fusion, thyroid surgery) Intubation  Radiotherapy	Injury to the recurrent laryngeal or vagus nerve  Trauma to the vocal processes, vocal cord granuloma or impaired function of the recurrent laryngeal nerve Dryness of the mucosa
<b>Medications</b> Antihistamines Diuretics Antihypertensives Nasal decongestants Antiparkinsonian agents Androgen therapy (e.g. for osteoporosis) Chemotherapy Inhaled corticosteroids Aspirin and NSAIDs	Extreme dryness of the mucosa Dryness of the mucosa Dryness of the mucosa Dryness of the mucosa Dryness of the mucosa Permanent thickening of the vocal cords Vocal cord paresis <i>Candida</i> infection and atrophy of the vocal cords Haemorrhage into the vocal cords
<b>Social and occupational factors</b> Tobacco smoking  Marijuana smoking Alcohol consumption  Excessive voice demand (e.g. singers, schoolteachers, members of the clergy)	Mucosal irritation or aggravation of pre-existing laryngeal conditions (e.g. dysphasia, leucoplakia) Mucosal irritation Dryness of the mucosa and thickening of laryngeal secretions Vocal cord trauma leading to granulomas or nodules



### Occupation

It is important to ask about occupation, and to establish whether patients have excessive vocal cord demand and what they expect from their voice. Certain occupational groups are extremely prone to trauma of the vocal cords – examples include schoolteachers and members of the clergy and, to a lesser extent, lawyers. The vast majority of these people have not had proper voice training. When thrown into a situation that demands excessive vocal effort, they may develop faulty speech habits to compensate for their inability to project adequately; these habits can, in turn, predispose to vocal

cord granulomas or nodules.

Singers are also prone to develop vocal cord nodules. However, most singers are aware of the need to maintain adequate laryngeal hygiene, regardless of whether they sing popular or classical music.

### Examination

General examination will be indicated by the history. The lymph nodes in the neck should be palpated if malignancy or inflammatory disease is suspected.

Indirect laryngoscopy with a laryngeal mirror is an excellent technique for picking up most laryngeal pathologies and assessing gross movement of the vocal

cords (see the box on this page). The procedure is not, however, a satisfactory method for assessing vocal function because the larynx is abnormally positioned when the patient is asked to say 'e'.

### Diagnosis

The most common cause of hoarseness would be acute laryngitis, which is diagnosed on the history alone. Indirect laryngoscopy is technically very difficult with an inflamed larynx and the procedure is generally not indicated, provided that symptoms resolve within a fortnight.

In patients who present with hoarseness lasting longer than a fortnight, one should suspect chronic laryngitis or lesions involving the lamina propria – such as vocal cord polyps (Figure 6), nodules or cysts. Reinke's oedema can occur in smokers – this is, in effect, a collection of fluid in the entire length of the cord in the lamina propria.

Muscle tension dysphonia in its various grades is extremely common and affects all stratas of society. It can vary from just a posterior gap between the vocal cords to a situation in which all the muscles of the larynx are bunched up so that the patient presents with a strangled voice. Severe forms of muscle tension dysphonia can be seen with the laryngeal mirror but type I muscle dysphonia, which is quite often associated with vocal nodules, can only be detected satisfactorily with videostroboscopy.

### Management

If the diagnosis is quite obvious, then this is treated along appropriate lines. Acute laryngitis, for example, should be treated with antibiotics, voice rest and inhalations of menthol and eucalyptus. Occasionally a professional voice user (e.g. a clergyman) may present with acute laryngitis – as an emergency procedure, prescription of corticosteroids (prednisolone [Panaf-cortelone, Solone], 25 mg daily for several days) may be justified under antibiotic cover to reduce the glottic oedema because

### Indirect laryngoscopy

Before commencing indirect laryngoscopy with a laryngeal mirror, the examiner must fully explain to the patient the steps involved in the procedure. The pharynx is then sprayed with lignocaine/phenylephrine (Cophenylcaine Forte). Adequate anaesthesia is achieved after five minutes.

The patient should be asked to open the mouth and protrude the tongue; a gauze square is then wrapped around the tongue and grasped with the examiner's left hand. A laryngeal mirror of suitable size is heated over a naked flame to prevent fogging. When the mirror is at a comfortable temperature (as judged by testing the metallic back of the mirror against the back of the examiner's hand), it should be introduced into the patient's mouth, placed purposefully against the soft palate and held steadily so as not to stimulate the pharyngeal muscles (Figure 7).

The patient is asked to take shallow pants. Then, when the examiner can visualise the larynx using either a head mirror or headlight shone on the laryngeal mirror, the patient is asked to make an 'e' sound, which brings the larynx further into the field of vision as the cords are adducted. The patient is then asked to take a deep breath, which causes the vocal cords to abduct. If a lesion is suspected on the underside, the patient may need to give a cough to bring the lower surface up into the examining field.

Note that a negative result on indirect laryngoscopy does not exclude pathology. If hoarseness is still present after a month and no pathology is seen after carrying out all of these manoeuvres, the patient should be referred to a laryngologist. If a carcinoma is suspected using the mirror, the patient should be referred immediately and seen within a couple of days. If polyps are observed the situation is not as urgent, but the patient should be seen within a week or two for more detailed assessment.



Figure 7. Indirect mirror examination.

of the patient's vocal commitments.

Laryngitis is always secondary to pathology in the upper or lower respiratory tract. In cases of chronic laryngitis, a sinus CT scan should be carried out to exclude any reservoir of infection in the area that could be affecting the larynx. Chronic laryngitis can be associated with reflux – ideally, 24-hour pH monitoring can be carried out if reflux is suspected; however, a barium swallow can be of assistance and is more practical. A trial of a proton pump inhibitor can give equally valuable information.

If the vocal cords are oedematous and there is no evidence of infection, gastro-oesophageal reflux disease should be suspected (particularly when there is inflammation in the interarytenoid region), and a proton pump inhibitor should be prescribed. These cases should be reviewed within one month and, if no progress has been made, referral to a laryngologist is indicated.

Every attempt should be made to improve the health of the upper respiratory tract by controlling sinus disease with appropriate antibiotic therapy and, when indicated, control of nasal allergy.

Some suggestions for advising patients with vocal disorders are given in the box on this page.

## Referral

If any pathology can be seen on indirect laryngoscopy, the sooner the patient is referred the better – occasionally, polyps can be misdiagnosed and prove to be a carcinoma. In addition, any patient who has been hoarse for longer than four weeks needs a specialist laryngological assessment to exclude carcinoma, preferably with videostroboscopy (see the box on this page).

Patients suspected of having voice disorders should be referred to a laryngologist for laryngeal assessment; if a speech disorder such as muscle tension dysphonia is present the patient will then be referred to a voice clinic. Professional singers should

have a skilled singing teacher, but they may benefit from additional advice from a speech therapist, who could provide instruction on warming up before a performance. Warming up exercises can

also be helpful for professional voice users who make speeches or give lectures.

Non-organic voice disorders are difficult to diagnose. Occasionally, the help of a psychiatrist may be enlisted.

## How to promote vocal health

- Explain that simple vocal hygiene requires drinking at least 1.5 L of water per day to keep the vocal tract adequately hydrated. Excessive coffee, tea, fruit juices and cordials and any food supplement that acts as a diuretic should be avoided.
- Encourage patients to stop smoking.
- Explain that medications that make the mucus more tenacious (such as antihistamines) should be avoided.
- Advise professional singers to avoid excessive vocal demands, especially in the presence of an upper respiratory tract infection. Drinking alcohol should be avoided during performances.
- Recommend warming up exercises before performances to stretch the intrinsic muscles of the larynx (e.g. humming or sliding up and down musical scales).
- Explain that eating a large meal tends to cause reflux and should be avoided before a performance.
- Suggest use of water vapour inhalations. Patients who occasionally have soreness of the throat after excessive vocal demands and have had all their other problems addressed may benefit from inhaling water vapour, with or without an additive such as menthol and eucalyptus, used either daily or as necessary.
- Consider referring the patient to a speech therapist.

## Videostroboscopy

A flexible nasendoscope is used for all patients who are assessed with videostroboscopy (Figure 8). The position of the larynx is normal with this examination and allows proper assessment of the vocal disorder and assessment of the so-called vocal wave. In normal voice, the larynx vibrates at up to 250 cycles per second. The images can be frozen on the screen.

Videostroboscopy allows detection of early carcinomas of the vocal cords and is the only way that one can differentiate between nodules and cysts, the treatments for which vary considerably. The technique provides excellent feedback for patients, especially professional voice users. It can also be reassuring for many patients to see their larynx on the video screen and know that they do not have any sinister pathology.



Figure 8. Flexible nasendoscopy performed with videostroboscopy.

### Surgery

Vocal cord palsy can be corrected and normal vocal function achieved by one of many thyroplasty procedures. Patients who have carcinoma of the larynx have an excellent prognosis regarding voice preservation after surgical removal of the tumour. In cases of early tumours, organ preservation can be achieved with radiotherapy, laser surgery or conservative laryngectomy. In very advanced cases of laryngeal cancer that necessitate total laryngectomy, the patient's voice can be rehabilitated using a prosthesis.

The treatment of specific lesions on the vocal cords has become far more accurate and precise with common use of the CO<sub>2</sub> laser and ever increasing refinement of microsurgery. Laryngeal preservation surgery has advanced dramatically, as has the effectiveness of radiotherapy. Botulinum toxin type A (Botox, Dysport) is now used for spasmodic dysphonia and

for severe cases of muscle tension dysphonia and resistant cases of vocal cord granulomas where there is associated muscle spasm.

Nodules are not necessarily an indication for surgery. In some situations, no surgical treatment is indicated – especially in singers and in young children. A skilled speech therapist can teach children with nodules how to project their voices with appropriate breathing techniques and posturing of the larynx. In the majority of cases, the nodules will resolve with such therapy, coupled with further growth of the maturing larynx. Removal of nodules in singers carries risks, and there have been a number of cases of litigation by performers against unwary laryngologists.

### Final comments

The diagnosis and treatment of vocal disorders has advanced dramatically over the last 30 years. Laryngeal function

and voice disorders can be measured more accurately with videostroboscopy and electromyography of the laryngeal muscles. Other techniques are being developed, such as videoglottography, but are still only of research value. The greatest step forward has been the appreciation that the management of laryngeal disorders depends on a team approach involving the GP, laryngologist and speech therapist together with a compliant and receptive patient. **MT**

### Acknowledgements

The author acknowledges the assistance of Mr Kym Diamantis, Consultant ENT Surgeon, and Ms Claire Olson-Jones, Speech Pathologist, with the photographs on pages 40 and 41, which are provided courtesy of Queen Elizabeth Hospital, Woodville, SA. The assistance of Mr John Ling, Consultant ENT Surgeon, and Ms Jan Hooper, Speech Pathologist, with the article is also acknowledged.